

# OIL-CIRCULATING STRUCTURE FOR FAN

## FIELD OF THE INVENTION

The present invention is relating to a bearing lubricating structure for DC fan without bushing, particularly to an oil-circulating structure for fan.

## BACKGROUND OF THE INVENTION

Since electronic device generates heat during operating, it will damage easily due to overheat without effective heat-dissipation. It is common to install a DC fan without bushing on electronic device for heat-dissipating. The DC fan without bushing has been well known to equip various bearings like a ball bearing or an oily bearing between fan and fan housing in order to enhance rotation and diminish noise for fan. The oily bearing possesses porous structure made by sintering copper alloy or iron alloy so as to absorb lubricant. However, the lubricant will be pushed to sputter by rotating a fan shaft to contaminate entire fan housing when the fan shaft in the oily bearing rapidly rotates, and the oil-retaining quantity of oily bearing reduces and distributes unevenly. Therefore, when the fan is used for a long time, the lubricating efficiency of bearing becomes bad gradually and noise of bearing becomes loud gradually, even the fan will stop rotating.

A heat-dissipating fan was disclosed in R.O.C. Taiwan Patent No. 471557 entitled "lubricating oil-circulating structure for fan shaft", which is composed of a housing, a stator and a rotor. A bearing has a bearing body with through holes and a ring portion is extended from one end of the bearing body to form an oil tank. A trench is set on the bearing body to make the released lubricant flow to the trench by passing the through holes then return to the oil tank and the through holes by passing the trench. Since the oil tank is set at the ring portion of the bearing and the trench is set on the bearing body, the lubricant will flow to the ring portion of the bearing and easy to contaminate the housing and oil-retaining quantity of bearing will decrease to weaken lubricating effect.

1 Besides, the oil tank and the trench are the shape of a line easy to result in gathering  
2 lubricant at one side only, so that the oil-circulating efficiency of lubricant becomes  
3 worse.

#### 4 SUMMARY

5 The primary object of the present invention is to provide an oil-circulating structure  
6 for fan. An oil-collecting recess trench has a double inner screw shape oil-guiding  
7 ditch that includes a left-hand internal thread oil-guiding ditch and a right-hand internal  
8 thread oil-guiding ditch. The left-hand internal thread oil-guiding ditch and the  
9 right-hand internal thread oil-guiding ditch crisscross in the oil-collecting recess trench  
10 to form a plurality of crisscrosses. A lubricant inside an oily bearing up-and-down  
11 flows inside the oil-collecting recess trench through the double inner screw shape  
12 oil-guiding ditch in order to enhance the internal-recycle oil-circulating efficiency.

13 The secondary object of the present invention is to provide an oil-circulating  
14 structure for fan. An oil-collecting recess trench has a double inner screw shape  
15 oil-guiding ditch that includes a left-hand internal thread oil-guiding ditch and a  
16 right-hand internal thread oil-guiding ditch. The left-hand internal thread oil-guiding  
17 ditch and the right-hand internal thread oil-guiding ditch crisscross in the oil-collecting  
18 recess trench to form a plurality of crisscrosses. A lubricant inside an oily bearing  
19 distributes over the oil-collecting recess trench by flowing through the double inner  
20 screw shape oil-guiding ditch so as to form an internal-recycle oil-circulating system for  
21 achieving oil-retaining and leak-proof efficiency without installing oil-retaining ring.

22 According to the oil-circulating structure of the present invention, an oily bearing is  
23 set in a fan housing. The oily bearing has an oil-collecting recess trench and a central  
24 axis hole for pivoting a fan shaft. The oil-collecting recess trench has a double inner  
25 screw shape oil-guiding ditch that includes a left-hand internal thread oil-guiding ditch  
26 and a right-hand internal thread oil-guiding ditch. The left-hand internal thread  
27 oil-guiding ditch and the right-hand internal thread oil-guiding ditch crisscross in the

1 oil-collecting recess trench to form a plurality of crisscrosses. A lubricant inside the  
2 oily bearing up-and-down flows inside the oil-collecting recess trench through the  
3 crisscrosses of the double inner screw shape oil-guiding ditch in order to construct an  
4 internal-recycle oil-circulating system.

#### 5 DESCRIPTION OF THE DRAWINGS

6 Fig.1 is a cross sectional view illustrating a fan assembly with a fan oil-circulating  
7 structure in accordance with the present invention.

8 Fig.2 is a perspective view of an oil-circulating structure for fan in accordance with  
9 the present invention.

10 Fig.3 is a top view of an oil-circulating structure for fan in accordance with the  
11 present invention.

12 Fig.4 is a cross sectional view of an oil-circulating structure for fan along Fig.3 line  
13 4-4 in accordance with the present invention.

14 Fig.5 is a cross sectional view of an oil-circulating structure for fan in a using status  
15 in accordance with the present invention.

#### 16 DETAILED DESCRIPTION OF THE PRESENT INVENTION

17 In relation to the fan oil-circulating structure, referring to Fig.1, the heat-dissipating  
18 fan 100 comprises a fan housing 110, a pivoting base 120, a fan hub 130, an oily bearing  
19 140 and stators 150. The oily bearing 140 is set between the fan housing 110 and the  
20 pivoting base 120. A central axis hole 141 is applied for pivoting a fan shaft 131 of the  
21 fan hub 130.

22 Referring to Fig.2, 3 and 4, the oily bearing 140 has a central axis hole 141 and a  
23 hollow oil-collecting recess trench 142 is formed on the central axis hole 141 inside wall  
24 of the oily bearing 140 so as to store lubricant in the central axis hole 141 of the oily  
25 bearing 140. The oil-collecting recess trench 142 has a double inner screw shape  
26 oil-guiding ditch that includes a left-hand internal thread oil-guiding ditch 143 (clockwise  
27 direction) and a right-hand internal thread oil-guiding ditch 144 (anti-clockwise direction).

1 The left-hand internal thread oil-guiding ditch 143 and the right-hand internal thread  
2 oil-guiding ditch 144 don't touch the fan shaft 131 when the fan shaft 131 is pivoted in  
3 the central axis hole 141. Thus lubricant can fully flow in the left-hand internal thread  
4 oil-guiding ditch 143 and the right-hand internal thread oil-guiding ditch 144. Both the  
5 left-hand internal thread oil-guiding ditch 143 and the right-hand internal thread  
6 oil-guiding ditch 144 may be square, V-shape, arc-shape or trapezoid, however in this  
7 embodiment they are V-shape. The left-hand internal thread oil-guiding ditch 143 and  
8 the right-hand internal thread oil-guiding ditch 144 crisscross in the oil-collecting recess  
9 trench 142 to form a plurality of crisscrosses 145 (showed in Fig.4). Referring to Fig.5,  
10 when the fan shaft 131 rotates, a lubricant flows through the left-hand internal thread  
11 oil-guiding ditch 143 and the right-hand internal thread oil-guiding ditch 144, in which  
12 separates at the crisscrosses 145 to up-and-down flow and recycle in the oil-collecting  
13 recess trench 142 so as to construct an internal-recycle oil-circulating system.

14 Referring to Fig.1 and fig.5, the oily bearing 140 is set on the pivoting base 120 of  
15 the fan housing 110. A stator 150 like coil, circuit board is set around the pivoting base  
16 120 for magnetically driving the fan hub 130 to rotate. When the stator 150 is powered  
17 on to generate electromagnetic induction for driving the fan hub 130 to rotate, the fan  
18 shaft 131 pivoted to the central axis hole 141 of the oily bearing 140 also rotates and  
19 pushes the lubricant inside the oil-collecting recess trench 142 to flow. Referring to  
20 Fig.5, as indicated by arrowhead, the lubricant flows along the left-hand internal thread  
21 oil-guiding ditch 143 and the right-hand internal thread oil-guiding ditch 144 and is  
22 divided to the left-hand internal thread oil-guiding ditch 143 and the right-hand internal  
23 thread oil-guiding ditch 144 while flowing to the crisscrosses 145, and up-and-down  
24 recycles in the oil-collecting recess trench 142 so as to perform an internal-recycle  
25 oil-circulating efficiency. Therefore, the oil-circulating structure for fan has an excellent  
26 lubrication with an internal-recycle oil-circulation and achieves an excellent oil-retaining  
27 efficiency, and which is unnecessary to install conventional oil-retaining ring between

1 conventional fan shaft and oily bearing.

2 The above description of embodiments of this invention is intended to be illustrated  
3 and not limiting. Other embodiments of this invention will be obvious to those skilled  
4 in the art in view of the above disclosure.

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